lever 204. As can be seen from FIG. 5, the pivoting lever 204 is downwardly bent at an angle in a z-shaped fashion. The central portion 202 extending parallel to the stater axis 88 moves along the peripheral surface of the change-over valve 24. This peripheral surface is provided with two stops 206 and 208. These stops 206 and 208 determine the first and the second positions of the change-over valve 24. Numeral 212 designates a rotary drive unit in the form of a servomotor. The axis 214 of the servomotor 212 is provided with a pivoting lever 216. The pivoting lever 216 is connected with the pivoting lever 204 through a rod 218. The pivoting levers 204 and 216 and the rod 218 form a linkage 220. The end of the pivoting lever 216 is provided with a block 222. The block 222 is movably guided into a guideway 224 in the longitudinal direction of the rod 218. However, the block 222 is held between two helical springs 226 and 228.

The change-over valve 24 can be switched between the first and second positions by the servomotor 212. The servomotor 212 moves the pivoting lever 204 until it engages e.g. the stop 208. The stop 208 simultaneously works as the end switch for the servomotor 212. By a certain after-running of the servomotor 212, the spring 228 is compressed a little bit more. After the servomotor 212 comes to a stop, the spring 228 partially relaxes. The remaining stress of the spring 228 in a bounce-free fashion presses the pivoting lever 204 through the bar 218 against the stop 208.

In the same way the switching to the second position is accomplished in which the pivoting lever 204 engages the stop 206. The described way of changing-over ensures a well-defined position of the rotor 26 in the two positions of the change-over valve 24.

The change-over valve 24 and the dosing needle 20 cooperate as follows:

The servomotor 212 moves the rotor 26 of the change-over valve 24 to the first position illustrated in FIG. 3. Thereby, the pivoting lever 204 engages the stop 208. By prior art means which are not further illustrated, the dosing needle 20 is moved with the carrier 142 above the sample inlet 56 which, in the first position of the change-over valve 24, is in the plane of the port 30. The sample inlet 56 comprises the needle guideway 122 and the sample inlet passage 128. Then, the sample inlet passage 128 communicates with the port 30 in the manner as illustrated in FIG. 5 for the port 32. The step motor 152 moves the rack body 140 with the dosing needle 20 downwards by means of the pinion 150 and the rack 148. Thereby, the dosing needle 20 is introduced by the needle guideway 122 into the sample inlet passage 128. Then, in stages of ten steps each, the step motor 152 advances the dosing needle 20. After ten steps each, the power supply of the step motor 152 is disconnected for a short time. When the dosing needle 20 engages the conical annular shoulder 136, the spring 158 is slightly compressed with further steps of the step motor 152. After disconnecting the power supply of the step motor 152, the rack body 140 is pressed back by the force of the spring 158 and the step motor 152 is slightly rotated back. This process is detected and indicates that the dosing needle 20 engages the annular shoulder 136.

With the subsequent withdrawl of the dosing needle 20 from the sample inlet 56 and the movement to its elevated original position, the necessary steps of the step motor 152 are counted. With the subsequent reintroduction of the dosing needle 20 into the sample inlet 56 for the following dosing processes, the dosing needle 20 is advanced by the step motor 152 by the thus determined number of steps and, in addition, by another forty steps. These additional forty steps effect a stress of the spring 158 and guarantee that the conical sealing surface 138 of the dosing needle 20 engages the conical annular shoulder 136 of the sealing body 108 with a defined sealing power. In this way, frictional sealing between the dosing needle 20 and the sealing body 108 is achieved. The sealing is virtually resistant to wear. The pre-stress of the spring 158 alway guarantees a sufficient contact force.

We claim:

1. Dosing device for analyzing apparatus, comprising:

a dosing loop (22) having a first end and a second end;

a change-over valve (24) connected to said dosing loop (22) and containing a stationary member (28) and a movable member (26) which is movable between a first and a second position relative to the stationary member (28);

said movable member (26) of said change-over valve (24) containing a sample inlet (56) and a sealing body (108) interposed between said movable member and said stationary member;

said change-over valve (24) assuming a first position in which the sample inlet (56) is connected to the first end of the dosing loop (22) and the second end of the dosing loop (22) is connected to a waste port (42) of the stationary member (28);

said change-over valve (24) assuming a second position in which the second end of the dosing loop (22) is connected to a carrier liquid port of the stationary member and the first end of the dosing loop (22) is connected to an analyzing apparatus port of the stationary member;

a dosing needle (20) having a front end and a rear end;

an actuating mechanism (141) coupled to said dosing needle (20) for selectively introducing the front end of the dosing needle into either one of a sample vessel (10) or the sample inlet (56) of the change-over valve (24);

a sample pump (66) connected to the rear end of the dosing needle (20) for aspirating sample liquid from the sample vessel (10) into the dosing needle (20) when the front end of the dosing needle (20) is placed in the sample vessel (10);

wherein said sample pump (66) transfers aspirated sample liquid from the dosing needle (20) into the dosing loop (22) when the first end of the dosing loop (22) is connected to the sample inlet (56) of the change-over valve (24) in the first position of the change-over valve;

the dosing needle (20) having formed at its front end (137) a tapered sealing surface (138);

the sample inlet (56) of said movable member (26) of the change-over valve (24) comprising a sample inlet passage (128) extending through the sealing body (108) of the change-over valve (24);

said sample inlet passage (128) having a straight first section (130) for receiving the front end (137) of the dosing needle (20) in a spaced relationship;

said sample inlet passage having a second section (132) having a smaller cross-section than said straight first section;

said sealing body (108) interposed between said movable member (26) and said stationary member (28) of said change-over valve (24), defining a control